

ICS'12 Spring Homework 2

- I. Integer representation using 1's and 2's complement. Assume we have an integer type of 8bits, fill in the following table.

Value	2's complement	1's complement	Sign-Magnitude
5	0000 0101	0000 0101	0000 0101
11	0000 1011	0000 1011	0000 1011
64	0100 0000	0100 0000	0100 0000
-64	1100 0000	1011 1111	1100 0000
0	0000 0000	0000 0000 or 1111 1111	1000 0000

- II. Expression evaluation in C language. In C language, if an evaluation expression contains both unsigned and signed values, then signed values will be implicitly casted into unsigned ones before evaluation. Please fill the following table with “<” or “>”.

Constant A	Constant B	Relation
-1	0U	>
-1	0	<
-1	-2U	>
-9U	-8	<
-65554	65553U	>

III. Unsigned Multiplication. Solve the following equation group step by step. Notice that each value is represented by unsigned integer of 4-bits.

$$\begin{cases} 0010 * x + 0100 * y = 1010 & (a) \\ 0100 * x + 0010 * y = 1000 & (b) \end{cases}$$

Your solution:

$$(b) - (a) \quad 0010 * x + 1110 * y = 1110 \quad (c)$$

$$(c) - (a) \quad 1010 * y = 0100$$

Result: $x = \underline{0001}$, $y = \underline{0010}$

IV. Error correcting. The C code below is supposed to output **-1**, but the actual output is **2147483646**. Please Explain the reason, and Correct the error. (Tips: You can refer to slides on page 33 of 5-cast for inspiration)

```
#include <stdio.h>
#include <string.h>

int main()
{
    int x = 2;
    char *str = "abcde";
    int y = (x - strlen(str)) / 2; //error

    printf("%d\n", y);
    return 0;
}
```

Solution:

Correct : `int y = (x - (int)strlen(str))/2.`

The error is caused by the return type of `strlen()` function. As it is *unsigned* type. We should cast it to *int* type.